DOCUMENT RESUME

ED 328 122 HE 024 167

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TITLE Promoting Fun in Physics.
INSTITUTION Virginia Commonwealth Univ., Richmond. Dept. of Physics.
PUB DATE 90
NOTE 12p.; This report is one of a group gathered by the AASCU/ERIC Model Programs Inventory Project, funded by the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities in collaboration with the ERIC Clearinghouse on Higher Education. For related documents see HE 024 163-176.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Career Awareness; Career Choice; Career Exploration; *College Programs; Demonstrations (Educational); *Educational Experiments; Elementary Secondary Education; Higher Education; Inservice Teacher Education; *Outreach Programs; *Physics; Program Descriptions; Recruitment; *Science Instruction
IDENTIFIERS *AASCU ERIC Model Programs Inventory Project; Virginia; Virginia Commonwealth University

ABSTRACT

This document reviews a collection of activities conducted by the Department of Physics at Virginia Commonwealth University to excite young people about physics so that they will be more likely to consider physics as a career. The Society of Physics Students performs demonstrations of physics experiments for Virginia high school physics classes and elementary and middle school science classes, to explain the basic principles involved. The Department of Physics sponsors an annual physics show for middle school students. An annual workshop on physics teaching assembles high school physics teachers from Virginia to discuss improvements in physics teaching and possible recruitment of students into physics. An additional faculty activity is assisting public school students with their science projects. (Author/JDD)

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Promoting Fun in Physics

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Started: September 1, 1989

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HE 024 167

AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

Promoting Fun in Physics

Abstract

The Department of Physics at Virginia Commonwealth University sponsors several activities for promoting physics in the public schools in Virginia in order to attract more young people to choose physics as a career. The Society of Physics Students prepares demonstrations and takes those to Virginia high schools physics classes and to elementary and middle school science classes to perform shows for the students and explain the basic principles involved. The department sponsors an annual physics show for middle school students, which is composed of a wide array of physics demonstrations. An annual workshop on physics teaching assembles high school physics teachers from Virginia to discuss improvements in physics teaching and possible recruitment of students into physics. Various professors have helped students in public schools with their science projects.

Promoting Fun in Physics

Description

Promoting fun in physics is a collection of activities by the Department of Physics at Virginia Commonwealth University to excite young people about physics so that they will be more likely to consider physics as a career. This project has the participation of the entire faculty, the graduate students, and the undergraduate physics majors. The Society of Physics Students (SPS) is actively engaged in a project "Phenomenal Physics", for which it won the 1990 Marsh W. White Award from the National Society of Physics Students. The students are building and preparing demonstrations in order to present exciting shows of the principles of physics. Although the groups targeted for these shows are the high school physics classes in Virginia, the show has been taken to elementary school and middle school science classes as well. A detailed description of that program is enclosed. In the Fall Semester, the department sponsors a show in the department for local middle school students. The entire faculty and some of the physics students join together to display the best demonstrations, some of which are demonstrated by the faculty, and others that allow a "hands-on" investigation by the young students. In the Spring Semester, the department sponsors a workshop on physics teaching, attended by high school physics teachers throughout Virginia. Included in the workshop is a tour of the physics department, a display of sample physics demonstrations by the SPS, and a panel discussion composed of VCU physics and education faculty, high school teachers, and VCU physics students. An additional activity of the department is the assistance of public school students with their science projects. One of these included a student preparing a high temperature superconductor and videotaping a demonstration of its property of magnetic levitation (the Meissner Effect).

The Virginia Commonwealth University (VCU) Society of Physics Students (SPS) Chapter is one of seven chapters in the country to receive in 1990 the Marsh W. White Award from the National Society of Physics Students. The purpose of this award is "to support projects designed to promote interest in physics among students and the general public". These awards were named in honor of Marsh W. White for 40 years of past and continuing service to the SPS. The award consists of $150, which will be matched by the Physics Department.

All SPS chapters in the country were eligible for this award, which required submitting a written proposal discussing a project designed to promote interest in physics. A panel of physicists reviewed these proposals and selected the winners. In its proposal for the Marsh W. White Award, the VCU Chapter outlined a plan to design and build simple, th ught-provoking demonstrations to illustrate physical principles of contemporary interest and their applications. In an effort to excite an interest in physics among young people, the Chapter proposed to take these demonstrations to area high schools and present them to the students. It is hoped that this will motivate the students to study physics beyond the high school level.

Initial contacts with high schools and progress on setting up and building demonstrations have already been achieved as part of the VCU Physics Department's "Workshop on Physics Teaching" for high school physics in Virginia. This event, which was held on May 18, 1990, was organized by Dr. Bijan Rao and was attended by 28 high school teachers, the VCU Physics faculty, and representatives from the VCU School of Education. The Society of Physics Students was involved in two ways. First, Joseph Shoop, the Chapter President, participated in a panel discussion involving topics related to physics education. Included were discussions about the enhancement of physics education through the involvement of groups such as the SPS, the American Association of Physics Teachers, and the American Institute of Physics. Other topics concerned the role of VCU in high school programs, the possibility of inviting talented students to engage in summer research programs and to take special courses at VCU, and the participation of high school teachers in research and advanced physics training at VCU. The final topic was investigating sources for financial assistance for the programs to be developed.

The second contribution of the SPS was to set up and present to the teachers ten sample demonstrations that could be taken to the high schools. This was met with great enthusiasm from the teachers, who were excited

about the prospect of physics students visiting their classes. As a result, many contacts were made for future visits. In fact, one teacher, Lucien Goode, was so inspired by the exhibition that he brought two of his classes from Open High School in Richmond to see the demonstrations on the following Tuesday, May 22. The students seemed genuinely interested in the presentations.

The demonstrations included the Monkey Hunt, Bernoulli's Principle, the Van de Graaff Generator, Low Temperature Physics, the Meissner Effect, Magnetic Fields, Lenz's Law, Lenses and Mirrors, Laser Communications, and Coupled Oscillations. Posters were made for each demonstration to summarize the physical principles involved, and miniature versions of all the posters were printed out on a single sheet and given to the high school teachers on May 18 and to the students on May 22. Materials for all of these demonstrations were provided by the Department of Physics.

Some of the demonstrations employed standard equipment that is used for the lectures in introductory courses at VCU. Others were built or prepared by SPS members this spring. The Meissner Effect demonstration required preparation of a high temperature Yttrium Barium Copper Oxide superconducting sample. This was made by SPS member Raymond Swineford, under the supervision of Dr. Steven Herr. Joseph Shoop designed

the Coupled Oscillations demonstration using two oscillating mirrors and four signal generators. Zane Gibbs assembled the Bernoulli's Principle demonstration based on a similar set-up at the Virginia Science Museum. John Coffman, Kaustuv Das, Thomas Inslee, Jiageng Niu, Scott Weber, James Wheeler, Dr. Tom McMullen, and Dr. Marilyn Bishop, SPS Advisor, also assisted in the demonstrations.

During the summer, the SPS plans to order more demonstrations and design others, so that when the high schools open in the fall, a complete set will be ready for a traveling show. Items on order include a fiber optics demonstration, rainbow glasses (with diffraction gratings), a radiometer, a memory wire, a "tornado" tube, "happy" and "unhappy" balls (high and low coefficients of restitution). More demonstrations and materials for building others will be ordered during the summer.

The members of the SPS have enjoyed the initial efforts on the Marsh W. White Program and are enthusiastic about the positive feedback both from the high school physics teachers and from students who have participated in this program. Everyone is encouraged that the second half of this project will be even more productive than the first.

Monkey Hunt

In projectile motion, the horizontal and vertical motions are independent of one another. This means that the bullet falls at the same rate as the monkey.

Bernoulli's Principle

A high air velocity means low pressure in the air stream. The ball is trapped in the low pressure area.

Van de Graaff Generator

A demonstration of static charges.

Low Temperature

Liquid Nitrogen has a temperature of

77 K
-196° C
-321° F

The Meissner Effect

Superconductors have no electrical resistance and reject magnetic fields. A strong magnet floats above the superconducting wafer.

Magnetic Fields

This demonstrates the interaction of magnetic fields.

Lenz's Law

The magnetic field of the electromagnet induces a current in the ring. The induced current produces a magnetic field which always opposes the original magnetic field.

Lenses and Mirrors

The laser beam demonstrates the reflection and refraction of light rays.

Laser Communications

Information is sent through the laser beam by varying the brightness

Coupled oscillations

The mirrors vibrate with varying frequencies demonstrating the superposition of waves

SPS NEWSLETTER

AMERICAN INSTITUTE OF PHYSICS

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Volume XXII, Issue 3 January, 1990

An Informative Newsletter for the Society of Physics Students

Marsh W. White Award Winners Selected

Congratulations to the seven SPS chapters that received Marsh W. White Awards in 1989! These cash awards are made from the ΣΠΣ Trust Fund to support student-oriented projects designed to promote interest in physics among students and the general public. All SPS chapters were eligible to submit proposals for awards. These awards were named in honor of Marsh W. White for his past 40 years and continuing service to SPS and ΣΠΣ. Listed below are the award winning SPS chapters:

Southwest Oklahoma State University
Weatherford, OK 73096
Dr. Garabed Armoudian, Advisor
Great Moments in Physics

Southern Nazarene University
Bethany, OK 73008
Dr. Ed Neuenschwander, Advisor
A Physics Circus and a Restored Observatory

Thiel College
Greenville, PA 16125
Dr. Michael E. Bacon, Advisor
A Community Outreach Program

Wright State University
Dayton, OH 45435
Dr. Jerry Clark, Advisor
Physics Demonstrations

University of Rhode Island
Kingston, RI 02881
Dr. Anthony C. Nunes, Advisor
SPS Egg Drop

Virginia Commonwealth University
Richmond, VA 23284-2000
Dr. Marilyn Bishop, Advisor
Phenomenal Physics

Wesleyan University
Middletown, CT 06457
Dr. Dale L. Doering, Advisor
Interest in Physics through Holography

National Office News

"Greetings from the National Office"
—from Sonja Lopez, SPS Supervisor

Good Tidings! We're starting a new year and a new decade. So let's start it off right. Previous scholarship response has been minimal to say the least. However, there are plenty of opportunities available to receive a scholarship. Send in your applications by 31 January 1990 to be considered. Remember, this is money you don't have to pay back. We all could use some of that.

Also, we need your ballots as soon as possible. The annual meeting will be held early this year, 10-12 March. We need your ballots in order to select the Zone Councilors and Assistant Zone Councilors you want to see hold office. It's unfortunate, I know, but we cannot read minds. So, please send those ballots in. Please do not hesitate to contact me or Vickie Porter at the National Office if you have not received your ballot.

Remember, this is your newsletter. Send in your past as well as any future chapter activities you plan. Others can glean ideas that you may have contributed to the newsletter and use them for their own SPS chapters. You may become a legend in your own time; who knows? But it won't happen if you don't write to us and please send PICTURES. We will print them.

Another thing, what would you like to see in your newsletter? A space has been provided on page five for suggestions, comments, complaints,

(continued on page 3)

Workshop on Physics Teaching

Meeting Rooms A/B, Students Commons
May 18, 1990

AGENDA

11.00 AM Registration and coffee

11.15 AM Inauguration and welcome address by Dr. E. v. P. Smith, Dean of the School of Humanities and Sciences

11.25 AM Introduction to the programs of the Physics Department by Dr. P. Jena, Chairman

11.45 AM L U N C H

1.00 PM Panel discussion on :

a) VCU participation in high school programs (special lectures, demonstrations etc.)

b) Participation of high school teachers in research/ advanced physics training at VCU

c) Possible selection of talented students in summer research program/ special courses at VCU

d) Involvement of the Society of Physics Students (VCU chapter)

e) Role to be played by the Association of Physics Teachers, American Institute of Physics etc.

f) Sources for financial assistance for the programs to be developed

2.30 PM Tour of the Department of Physics